PART IV: GROUND WATER ASSESSMENT

Table 4.1.1 is designed to provide an indication of the most critical contaminant sources and contaminants impacting ground water resources in Louisiana. Table 4.1.2 provides a summary of Louisiana ground water protection programs. It provides an overview of legislation, statutes, rules, and/or regulations that are in place. It also provides an indication of how comprehensive ground water protection activities are in Louisiana.

The Environmental Evaluation Division's **BASELINE MONITORING PROJECT** provides water quality data from fresh water aquifers around the State. Wells producing from a common aquifer are sampled in a narrow time frame. The smaller aquifers can be sampled in one or two days, whereas, the larger aquifers may take several months to complete. At such time when all project wells of a particular aquifer have been sampled, a summary report is written.

For this report, EPA has encouraged States to select an aquifer or hydrogeologic setting and discuss available data that best reflects the quality of the resource. For 2004, the baseline monitoring networks for the Evangeline aquifer is discussed.

Index to Table 4.1.1

Factors in selecting a contaminant source

A. Human health and/or environmental risk (toxicity)
B. Size of the population at risk
C. Location of the sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. State findings, other findings
G. Documented from mandatory reporting
H. Geographic distribution/occurrence
I. Other criteria - high to very high priority in localized areas of the state

Contaminants

A. Inorganic pesticides
B. Organic pesticides
C. Halogenated solvents
D. Petroleum compounds
E. Nitrate
F. Fluoride
G. Salinity/brine
H. Metals
I. Radionuclides
J. Bacteria
K. Protozoa
L. Viruses
M. Other - sulfates from gypsum stacks

Table 4.1.1
Major sources of ground water contamination in Louisiana's Southern Hills Aquifer System.

Contaminant Source	Ten Highest-Priority Sources(√)	Factors in Selecting a Contaminant Source	Contaminants
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications			
Irrigation practices			
Pesticide applications			
On-farm agricultural mixing and loading procedures			
Land application of manure (unregulated)			
Storage and Treatment			
Land Application			
Material stockpiles			
Storage tanks (above ground)	√	A.B.C.D.E.F.G	B.C.D
Storage tanks (underground)	√	A.B.C.D.E.F.	B.C.D
Surface impoundments	√	A.B.C.D.E.F.G	C.D.G.H.J.L
Waste piles	√	D.G	I.M
Waste tailings			
Disposal Activities			
Deep injection wells			
Landfills	√	A.B.C.D.E.F.G	A.B.C.D.E.H
Septic systems	√	C.D.G	A.B.C.D.E.H.J.L
Shallow injection wells			
Other			
Hazardous waste generators*			
Hazardous waste sites*			
Industrial facilities*			
Material transfer operations*			
Mining and mine drainage			
Pipelines and sewer lines	√	A.B.C.D.E.F.G	C.D.G
Salt storage and road salting			
Salt water intrusion	√	B.C.E.G	G
Spills	√	B.D.G	C.D
Transportation of materials			
Urban runoff	√	A,B,D,G	A,B,C,D,E,H,J,L
Small-scale manufacturing and repair shops			
Other sources (please specify)			

* Represents facilities with multiple sources of ground water contamination rather than unit sources

Table 4.1.2
Summary of state ground water protection programs for Louisiana.

Programs or Activities	Check	Implementation Status	Responsible State Agency
Active SARA Title III Program	√	Fully established	LDEQ
Ambient ground water monitoring system	√	Fully established	LDEQ
Aquifer vulnerability assessment	√	Fully established	LDEQ
Aquifer mapping	√	Fully established	LDEQ
Aquifer characterization	√	Continuing efforts	LDOTD
Comprehensive data management system	√	Continuing efforts	LDEQ
EPA-endorsed Core Comprehensive State Ground Water Protection Program(CSGWPP)	√	Pending	LDEQ
Ground water discharge permits	√	Fully established	LDNR(UIC)
Ground water Best Management Practices	√	Continuing efforts	LDEQ
Ground water legislation	√	Fully Established	LDNR
Ground water classification	√	Fully established	LDEQ
Ground water quality standards	√	Continuing efforts	LDEQ
Interagency coordination for ground water protection initiatives	√	Fully established	LDEQ
Nonpoint source controls	√	Continuing efforts	LDEQ
Pesticide State Management Plan	√	Fully Established	LDAF
Pollution Prevention Program	√	Continuing efforts	LDEQ
Resource Conservation and Recovery Act (RCRA) Primacy	√	Fully established	LDEQ
Source Water Assessment Program	√	Fully established	LDEQ
State Superfund	√	Fully established	LDEQ
State RCRA Program incorporating more stringent requirements than RCRA Primacy	√	Continuing efforts	LDEQ
State septic system regulations	√	Fully established	LDHH
Underground storage tank installation requirements	√	Fully established	LDEQ
Underground Storage Tank Remediation Fund	√	Fully established	LDEQ
Underground Storage Tank Permit Program	√	Fully established	LDEQ
Underground Injection Control Program	√	Fully established	LDNR
Vulnerability assessment for drinking water/wellhead protection	√	Fully established	LDEQ
Well abandonment regulations	√	Fully established	LDOTD
Wellhead Protection Program(EPA-approved)	√	Fully established	LDEQ
Well installation regulations	√	Fully established	LDOTD

Ambient Monitoring Network for the Evangeline Aquifer

The data that follows were derived from the **BASELINE MONITORING PROJECT** of the Environmental Evaluation Division of the Louisiana Department of Environmental Quality. The project is conducted as a Clean Water Act, Section 106 activity and the objective of the project is to provide water quality data from freshwater aquifers across Louisiana that will be used to aid the Environmental Evaluation Division in formulating and implementing Ground Water Protection Strategy for the State.

Figure 4.1.1 shows the geographic location of the Evangeline aquifer and the associated project wells, whereas Table 4.1.5 lists the wells in the aquifer, their total depths, and the use made of produced waters.

In January of 2001, eleven wells were sampled which produce from the Evangeline aquifer. Seven of the wells are classified as public supply wells, one well is classified as domestic, one as industrial, and one as an irrigation well. The remaining well is classified as "other" by the Louisiana Department of Transportation and Development (LDOTD), however it is used as a public supply well. The wells are located in seven parishes from the central to the southwest part of the state.

Well data for registered water wells were obtained from the Louisiana Department of Transportation and Development's Water Well Registration Data file

Introduction

Geology

The Evangeline aquifer is comprised of unnamed Pliocene sands and the Pliocene-Miocene Blounts Creek member of the Fleming formation. The Blounts Creek consists of sands, silts, and silty clays, with some gravel and lignite. The sands of the aquifer are moderately well to well sorted and fine to medium grained with interbedded coarse sand, silt, and clay. The mapped outcrop corresponds to the outcrop of the Blounts Creek member, but downdip, the aquifer thickens and includes Pliocene sand beds that do not outcrop. The confining clays of the Castor Creek member (Burkeville aquiclude) retard the movement of water between the Evangeline and the underlying Miocene aquifer systems. The Evangeline is separated in most areas from the overlying Chicot aquifer by clay beds; in some areas the clays are missing and the upper sands of the Evangeline are in direct contact with the lower sands and gravels of the Chicot.

Hydrogeology

Recharge to the Evangeline aquifer occurs by the direct infiltration of rainfall in interstream, upland outcrop areas and the movement of water through overlying terrace deposits, as well as leakage from other aquifers. Fresh water in the Evangeline is separated from water in stratigraphically equivalent deposits in southeast Louisiana by a saltwater ridge in the Mississippi River valley. The hydraulic conductivity of the Evangeline varies between 20-100 feet/day.

The maximum depths of occurrence of freshwater in the Evangeline range from 150 feet above sea level, to 2,250 feet below sea level. The range of thickness of the fresh water interval in the Evangeline is 50 to 1,900 feet. The depths of the Evangeline wells that were monitored in conjunction with the BMP range from 170 to 1,715 feet.

Table 4.1.3

Aquifer Monitoring Data

Hydrogeologic Setting: **Evangeline Aquifer**
Spatial Description: **Central Southwestern Louisiana**
Map Available: **See Figure 4.1.1**
Data Reporting Period: **August 2000 – June 2001**

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells									
			No detections of parameters above MDLs or background levels		Nitrite/nitrate concentrations range from background levels to less than or equal to 5 mg/l. No detections of parameters other than nitrite/nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable.			Nitrite/nitrate ranges from greater than 5 to less than or equal to 10 mg/l. Other parameters are detected at concentrations exceeding the MDL but are less than or equal to the MCLs.	Parameters are detected at concentrations exceeding the MCLs	Number of wells removed from service	Number of wells requiring special treatment	Back-ground para-meters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas	Nitrite/ nitrate < 1 mg/l	Nitrite/ nitrate ≥ 1 to ≤5 mg/l	Number of wells in sensitive or vulnerable areas					
Ambient Monitoring Network	11	VOC	11									
		SOC	11									
		NO3	8		3							
		*Other	9					2				

***For Other category, the following metals were considered: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Mercury, Nickel, Selenium, Lead, and Thallium.**

Interpretation of Data

Field, Water Quality, and Nutrient, Parameters

Table 4.1.6 lists the field parameters that are checked and the water quality and nutrients parameters that are sampled for at each well. It also shows the field results and the water quality and nutrients analytical results for each well. Table 4.1.8 provides an overview of field data, water quality data, and nutrients data for the Evangeline aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, this Office does use the MCLs as a benchmark for further evaluation.

A review of the analyses listed on Table 4.1.6 shows that no primary MCL was exceeded for field, water quality, or nutrients parameters.

Federal Secondary Drinking Water Standards

EPA has set secondary standards that are defined as non-enforceable taste, odor, or appearance guidelines.

Field and laboratory data contained in Table 4.1.6 show that the following secondary MCLs (SMCLs) were exceeded.

Color – SMCL = 15 PCU

EV-858 – 20 PCU, duplicate – 25 PCU

Total Dissolved Solids (TDS) – SMCL = 500 ppm

AV-441 – 602 ppm
EV-858 – 538 ppm, duplicate – 556 ppm

Comparison To Historical Data

Table 4.1.10 lists the current field, water quality, and nutrients data averages alongside those parameters' data averages for the two previous sampling rotations (three and six years prior). A comparison of these averages show that the water quality characteristics of ground water produced from the Evangeline aquifer has not changed significantly since the 1995 fiscal year (FY) sampling.

Inorganic Parameters

Table 4.1.7 shows the inorganic (total metals) parameters that are sampled for and the analytical results for those parameters for each well. Table 4.1.9 provides an overview of inorganic data for the Evangeline aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

A review of the analyses listed on Table 4.1.7 shows that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 4.1.7 show that the following secondary MCL (SMCL) was exceeded.

Iron – SMCL = 300 ppb

CA-1362 – 440 ppb

Comparison To Historical Data

Table 4.1.11 lists the current inorganic data averages alongside the inorganic data averages for the two previous sampling rotations (three and six years prior). A comparison of these averages show that while there are some general fluctuations over the six-year period, for the most part, the inorganic characteristics of ground water produced from the Evangeline aquifer has not changed significantly since the FY 1995 sampling.

Volatile Organic Compounds

Table 4.1.12 shows the volatile organic compound (VOC) parameters that are sampled for. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of a VOC would be discussed in this section.

No VOC was detected during the 2001 sampling of the Evangeline aquifer.

Semivolatile Organic Compounds

Table 4.1.13 shows the semivolatile organic compound parameters that are sampled. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of a semivolatile would be discussed in this section.

Federal Primary Drinking Water Standards

Laboratory data show that ten wells exceeded the MCL of 6 parts per billion (ppb) for bis(2-ethylhexyl)phthalate (BEHP). However, every well that was sampled in the Evangeline, as well as both field blanks and one of the laboratory blanks, exhibited values for BEHP. Therefore, it is this Office's opinion that the values exhibited for BEHP are due to laboratory or field contamination and are considered invalid.

Taking into consideration the invalid BEHP concentrations, no primary MCL was exceeded for the semivolatile parameters.

Federal Secondary Drinking Water Standards

None of the semivolatiles sampled have current SMCLs.

Detection of Semivolatiles With No Standards

There were no detections of semivolatiles that fit under this category.

Pesticides and PCBs

Table 4.1.14 shows the pesticide and PCB parameters that are sampled for. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of a pesticide or PCB would be discussed in this section.

No pesticide or PCB was detected during the 2001 sampling of the Evangeline aquifer.

Common Water Characteristics

Table 4.1.4 below highlights some of the more common water characteristics that are considered when studying ground water quality. The minimum, maximum, and average values that were found during the current sampling of the Evangeline aquifer for pH, TDS, hardness, chloride, iron, and nitrite-nitrate are listed in the table. Figures 4.1.2, 4.1.3, 4.1.4, and 4.1.5 respectively, represent the contoured data for pH, TDS, chloride, and iron. The data average for hardness shows that the ground water produced from this aquifer is generally soft[1].

Table 4.1.4

Common Water Characteristics (FY2001)

Parameter	Minimum	Maximum	Average
pH (SU)	5.49	8.73	7.05
TDS (ppm)	35.7	602.0	220.1
Hardness (ppm)	<5	50.9	19.7
Chloride (ppm)	3.3	97.5	22.4
Iron (ppb)	10.00	440.0	93.58
Nitrite-Nitrate, as N (ppm)	0.03	0.06	0.03

Summary and Recommendations

In summary, the data show that the ground water produced from this aquifer is generally soft, and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no project well that was sampled during the Fiscal Year 2001 monitoring of the Evangeline aquifer exceeded a primary MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines. A comparison to historical BMP data show that while there are some general fluctuations, for the most part, the characteristics of the ground water produced from the Evangeline aquifer has not changed significantly since the FY 1995 sampling.

It is recommended that the Project wells assigned to the Evangeline aquifer be re-sampled as planned in approximately three years. In addition, several wells should be added to the eleven currently in place to increase the well density for this aquifer.

1 Classification based on hardness scale from: *Peavy, H.S. et al. Environmental Engineering, 1985.*

Table 4.1.5

List of Project Wells Sampled

Project NUMBER	Parish	Well Number	Date Sampled	Owner	Depth (Feet)	Well Use
198601	ALLEN	AL-120	01/09/2001 01/22/2001	CITY OF OAKDALE	910	PUBLIC SUPPLY
199504	ALLEN	AL-363	01/09/2001 01/22/2001	WEST ALLEN PARISH WATER DIST.	1715	PUBLIC SUPPLY
200102	ALLEN	AL-391	01/09/2001	FAIRVIEW WATER SYSTEM	800	PUBLIC SUPPLY
199327	AVOYELLES	AV-441	01/23/2001	TOWN OF EVERGREEN	319	PUBLIC SUPPLY
199119	BEAUREGARD	BE-410	01/09/2001 01/22/2001	BOISE CASCADE	474	INDUSTRIAL
199505	BEAUREGARD	BE-512	01/08/2001 01/22/2001	SINGER WATER DISTRICT	918	PUBLIC SUPPLY
200103	CALCASIEU	CA-1362	01/08/2001 01/22/2001	LA WATER CO	635	PUBLIC SUPPLY
199503	EVANGELINE	EV-858	01/23/2001	SAVOY SWORDS WATER SYSTEM	472	PUBLIC SUPPLY
199313	RAPIDES	R-1350	01/23/2001	PRIVATE OWNER	180	IRRIGATION
199506	VERNON	V-5065Z	01/22/2001	PRIVATE OWNER	170	DOMESTIC
200101	VERNON	V-668	01/09/2001 01/22/2001	LDWF/FORT POLK WMA HQ	280	OTHER

Table 4.1.6

Summary of Field, Water Quality, and Nutrients Data

Well Number	Cond. mmhos/cm	pH SU	Sal. ppt	Temp. ^{o}C	Alk. ppm	Cl ppm	Color PCU	Cond. umhos/cm	SO4 ppm	TDS ppm	TSS ppm	Turb. NTU	NH3 (as N) ppm	Hard. ppm	Nitrate-Nitrite (as N) ppm	TKN ppm	Tot. P ppm
AL-120	0.3	8.3	0.14	23.18	154.0	4.20	2.0	312.0	7.10	184.0	<4.0	<1.0	<0.10	<5.0	<0.05	0.18	0.11
AL-363	0.486	8.73	0.23	23.64	256.0	4.20	26.0	500.0	3.10	278.0	<4.0	<1.0	<0.10	<5.0	<0.05	0.24	0.28
AL-391	0.24	7.99	0.11	22.18	120.0	4.90	2.0	246.0	6.20	141.0	<4.0	<1.0	0.12	35.9	<0.05	0.39	0.09
AV-441	1.051	6.51	0.52	20.07	415.0	96.20	14.0	1000.0	9.40	602.0	<4.0	<1.0	0.36	14.2	<0.05	0.60	0.12
BE-410	0.182	7.45	0.09	21.81	86.9	5.70	<5.0	189.0	3.20	119.0	<4.0	<1.0	<0.10	50.9	0.05	<0.10	0.06
BE-512	No Data			24.16	164.0	5.50	2.0	333.0	6.50	182.0	<4.0	<1.0	<0.10	<5.0	<0.05	0.58	0.08
BE-512*	No Data			24.16	164.0	5.40	2.0	322.0	6.60	196.0	<4.0	<1.0	<0.10	<5.0	<0.05	0.15	0.10
CA-1362	0.282	6.48	0.13	23.18	126.0	15.80	3.0	285.0	2.40	183.0	<4.0	<1.0	<0.10	37.8	<0.05	0.13	0.28
EV-858	No Data				358.0	97.50	20.0	930.0	<1.25	538.0	<4.0	<1.0	0.44	39.9	<0.05	0.68	0.27
EV-858*	No Data				357.0	97.40	25.0	934.0	<1.25	556.0	<4.0	<1.0	0.47	40.0	<0.05	0.69	0.34
R-1350	0.072	5.49	0.03	18.86	22.8	4.10	5.0	72.6	6.30	89.3	<4.0	1.0	<0.10	8.4	<0.05	0.32	<0.05
V-5065Z	0.071	5.6	0.03	15.69	26.8	5.00	<5.0	72.0	1.70	69.3	<4.0	<1.0	<0.10	14.8	0.06	0.13	<0.05
V-668	0.035	6.87	0.02	17.68	14.9	3.30	<5.0	35.6	<1.25	35.7	<4.0	<1.0	<0.10	7.5	0.03	<0.10	<0.05

* Denotes duplicate sample.

Table 4.1.7

Summary of Inorganic Data

Well Number	Antimony ppb	Arsenic ppb	Barium ppb	Beryllium ppb	Cadmium ppb	Chromium ppb	Copper ppb	Iron ppb	Lead ppb	Mercury ppb	Nickel ppb	Selenium ppb	Silver ppb	Thallium ppb	Zinc ppb
AL-120	<5.0	<5.0	9.8	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	22.8
AL-363	<5.0	<5.0	8.7	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	10.0
AL-391	No Data														
AV-441	<5.0	<5.0	57.5	<1.0	<1.0	<5.0	8.1	300.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	15.5
BE-410	<5.0	<5.0	148.0	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
BE-512	<5.0	<5.0	16.6	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CA-1362	<5.0	<5.0	200.0	<1.0	<1.0	<5.0	<5.0	440.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	19.7
EV-858	<5.0	<5.0	230.0	<1.0	<1.0	<5.0	<5.0	93.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
EV-858*	<5.0	<5.0	214.0	<1.0	<1.0	<5.0	<5.0	72.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	31.0
R-1350	<5.0	<5.0	73.9	<1.0	1.3	<5.0	32.4	26.4	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	29.2
V-5065Z	<5.0	<5.0	73.9	<1.0	1.3	<5.0	32.4	26.4	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	29.2
V-668	<5.0	<5.0	148.0	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0

* Denotes duplicate sample.

Table 4.1.8

Field, Water Quality, and Nutrients Statistics

Parameter	Minimum	Maximum	Average
pH (SU)	5.49	8.73	7.05
Temperature ^{O}C	15.69	24.16	21.05
Sp. Conductivity (mmhos/cm) (Field)	0.035	1.051	0.302
Salinity (ppt)	0.02	0.52	0.14
TSS (ppm)	<4	<4	<4
TDS (ppm)	35.7	602.0	220.1
Alkalinity (ppm)	14.9	415.0	158.6
Hardness (ppm)	<5	50.9	19.7
Turbidity (NTU)	<1	1.00	<1
Sp. Conductivity (umhos/cm) (Lab)	35.6	1000.0	361.4
Color (PCU)	<5	26.0	7.4
Chloride (ppm)	3.3	97.5	22.4
Sulfate (ppm)	<1.25	9.40	4.29
Nitrite-Nitrate, as N (ppm)	0.03	0.06	0.03
Phosphorus (ppm)	<0.05	0.28	0.12
TKN (ppm)	<0.10	0.68	0.30
Ammonia (ppm)	<0.1	0.44	0.12

Table 4.1.9
Inorganic Statistics

Parameter	Minimum	Maximum	Average
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	8.7	230.00	96.64
Beryllium (ppb)	<2	<2	<2
Cadmium (ppb)	<2	<2	<2
Chromium (ppb)	<5	<5	<5
Copper (ppb)	<5	32.40	9.04
Iron (ppb)	<20.00	440.00	93.58
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	<5	<5	<5
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<1	<1	<1
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	<10	29.20	14.64

Table 4.1.10

Three-year Field, Water Quality, and Nutrients Statistics

Parameter	FY 1995 Average	FY 1998 Average	FY 2001 Average
pH (SU)	7.19	7.04	7.05
Temperature ^{O}C	23.31	22.92	21.05
Sp. Conductivity (mmhos/cm) (Field)	0.568	0.524	0.302
Salinity (ppt)	0.26	0.22	0.14
TSS (ppm)	<4	<4	<4
TDS (ppm)	337.8	338.6	220.1
Alkalinity (ppm)	220.6	197.7	158.6
Hardness (ppm)	14.3	12.2	19.7
Turbidity (NTU)	<1	<1	<1
Sp. Conductivity (umhos/cm) (Lab)	543.4	470.3	361.4
Color (PCU)	30.0	7.5	7.4
Chloride (ppm)	23.8	29.6	22.4
Sulfate (ppm)	5.28	4.27	4.29
Nitrite-Nitrate, as N (ppm)	<0.02	0.03	0.03
Phosphorus (ppm)	0.16	0.15	0.12
TKN (ppm)	0.59	0.18	0.30
Ammonia (ppm)	0.19	0.17	0.12

Table 4.1.11

Three-year Inorganic Statistics

PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE
Antimony (ppb)	<5	No Data	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	63.61	45.95	96.64
Beryllium (ppb)	<2	<2	<2
Cadmium (ppb)	<2	<2	<2
Chromium (ppb)	<5	<5	<5
Copper (ppb)	19.82	50.45	9.04
Iron (ppb)	142.35	116.35	93.58
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	5.56	<5	<5
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<1	1.19	<1
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	150.40	114.58	14.64

Table 4.1.12

List of VOC Analytical Parameters (Method 624)

Compound	PQL (ppb)
CHLOROMETHANE	2
VINYL CHLORIDE	2
BROMOMETHANE	2
CHLOROETHANE	2
TRICHLOROFLUOROMETHANE	5
1,1-DICHLOROETHENE	2
METHYLENE CHLORIDE	2
TRANS-1,2-DICHLOROETHENE	2
METHYL-t-BUTYL ETHER	2
1,1-DICHLOROETHANE	2
CHLOROFORM	2
1,1,1-TRICHLOROETHANE	2
CARBON TETRACHLORIDE	2
BENZENE	2
1,2-DICHLOROETHANE	2
TRICHLOROETHENE	2
1,2-DICHLOROPROPANE	2
BROMODICHLOROMETHANE	2
CIS-1,3-DICHLOROPROPENE	2
TOLUENE	2
TRANS-1,3-DICHLOROPROPENE	2
1,1,2-TRICHLOROETHANE	2
TETRACHLOROETHENE	2
DIBROMOCHLOROMETHANE	2
CHLOROBENZENE	2
ETHYLBENZENE	2
P&M XYLENE	4
O-XYLENE	2
STYRENE	2
BROMOFORM	2
1,1,2,2-TETRACHLOROETHANE	2
1,3-DICHLOROBENZENE	2
1,4-DICHLOROBENZENE	2
1,2-DICHLOROBENZENE	2

PQL = Practical Quantitation Limit
ppb = parts per billion

Table 4.1.13

List of Semi-volatile Analytical Parameters (Method 625)

Compound	PQL (ppb)
N-Nitrosodimethylamine	2
Chlorobenzene	2
Phenol	2
Bis(2-chloroethyl)ether	2
2-Chlorophenol	2
1,3-Dichlorobenzene	2
1,4-Dichlorobenzene	2
1,2-Dichlorobenzene	2
Bis(2-chloroisopropyl)ether	6
N-Nitroso-di-n-propylamine	4
Hexachloroethane	2
Nitrobenzene	2
Isophorone	2
2,4-Dimethylphenol	4
2-Nitrophenol	6
1,3,5-Trichlorobenzene	2
Bis(2-chloroethoxy)methane	2
1,2,4-Trichlorobenzene	2
Naphthalene	2
2,4-Dichlorophenol	4
Hexachlorobutadiene	2
1,2,3-Trichlorobenzene	2
4-Chloro-3-methylphenol	4
Hexachlorocyclopentadiene	6
1,2,4,5-Tetrachlorobenzene	2
2,4,6-Trichlorophenol	6
1,2,3,4-Tetrachlorobenzene	2
2-Chloronaphthalene	2
Dimethylphthalate	2
2,6-Dinitrotoluene	4
Acenaphthylene	2
4-Nitrophenol	6
2,4-Dinitrophenol	12
Acenaphthene	2
Pentachlorobenzene	2
2,4-Dinitrotoluene	6
Diethylphthalate	2
4-Chlorophenyl phenyl ether	2
Fluorene	2

Table 4.1.13

Semivolatile Parameters (Cont'd)

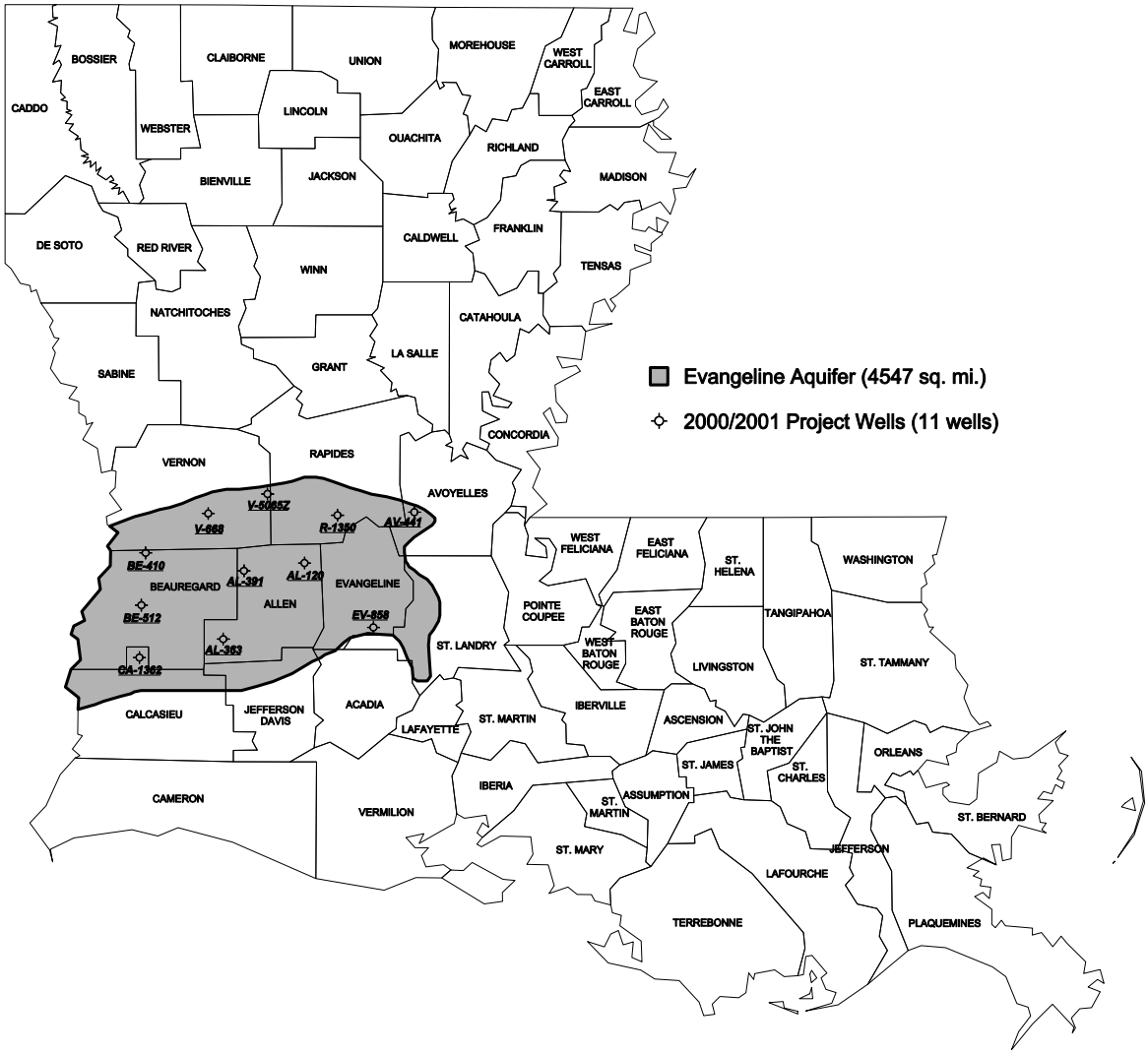
Compound	PQL (ppb)
4,6-Dinitro-2-methylphenol	12
N-Nitrosodiphenylamine/Dipheny	2
4-Bromophenyl phenyl ether	2
Hexachlorobenzene	2
Pentachlorophenol	10
Phenathrene	2
Anthracene	2
Di-n-butylphthalate	2
Fluoranthene	2
Benzidine	20
Pyrene	2
Butylbenzylphthalate	2
Bis(2-ethylhexyl)phthalate	2
3,3'-Dichlorobenzidine	10
Benzo(a)anthracene	6
Chrysene	4
Di-n-octylphthalate	2
Benzo(b)fluoranthene	6
Benzo(k)fluoranthene	6
Benzo(a)Pyrene	6
Indeno(1,2,3-cd)pyrene	6
Dibenz(a,h)anthracene	6
Benzo(g,h,i)perylene	6

Table 4.1.14

List of Pesticide and PCB Analytical Parameters (Method 625)

Compound	PQL (ppb)
Alpha BHC	2
Beta BHC	2
Gamma BHC	2
Delta BHC	2
Heptachlor	2
Aldrin	2
Heptachlor epoxide	2
Chlordane	2
Endosulfan I	2
4,4-DDE	2
Dieldrin	2
4,4-DDD	2
Endrin	2
Toxaphene	2
Endosulfan II	2
Endrin Aldehyde	2
4,4-DDT	2
Endosulfan Sulfate	2
Methoxychlor	2
Endrin Ketone	2
PCB 1221/ PCB 1232	10
PCB 1016/ PCB 1242	10
PCB 1254	10
PCB 1248	10
PCB 1260	10

BASELINE MONITORING PROJECT WELLS OF THE EVANGELINE AQUIFER



Aquifer boundary digitized from Louisiana Hydrologic Map No. 2: Areal Extent of Freshwater in Major Aquifers of Louisiana, Smoot, 1986; USGS/LDOTD Report 86-4150.

06/31/2001

Figure 4.1.1
Location Plat, Evangeline Aquifer

EVANGELINE AQUIFER - pH (SU)

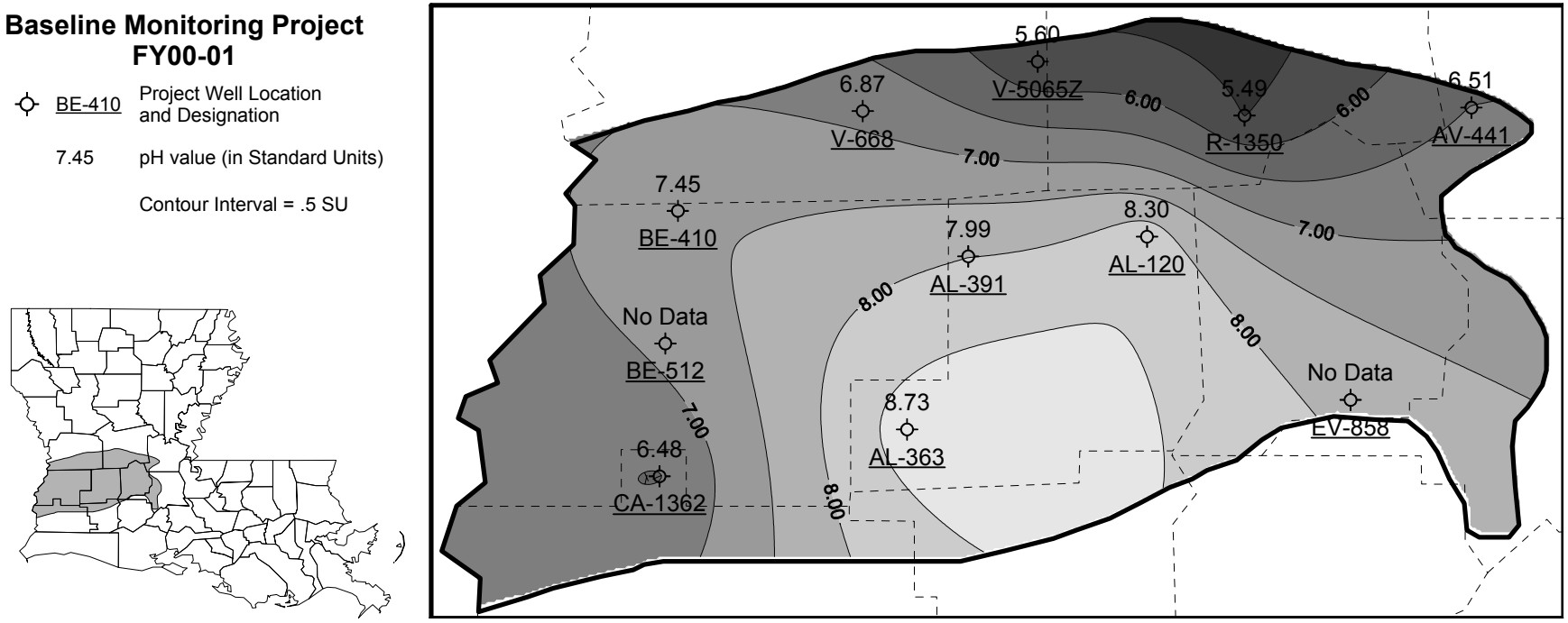


Figure 4.1.2
Map of pH Data

EVANGELINE AQUIFER - TDS (PPM)

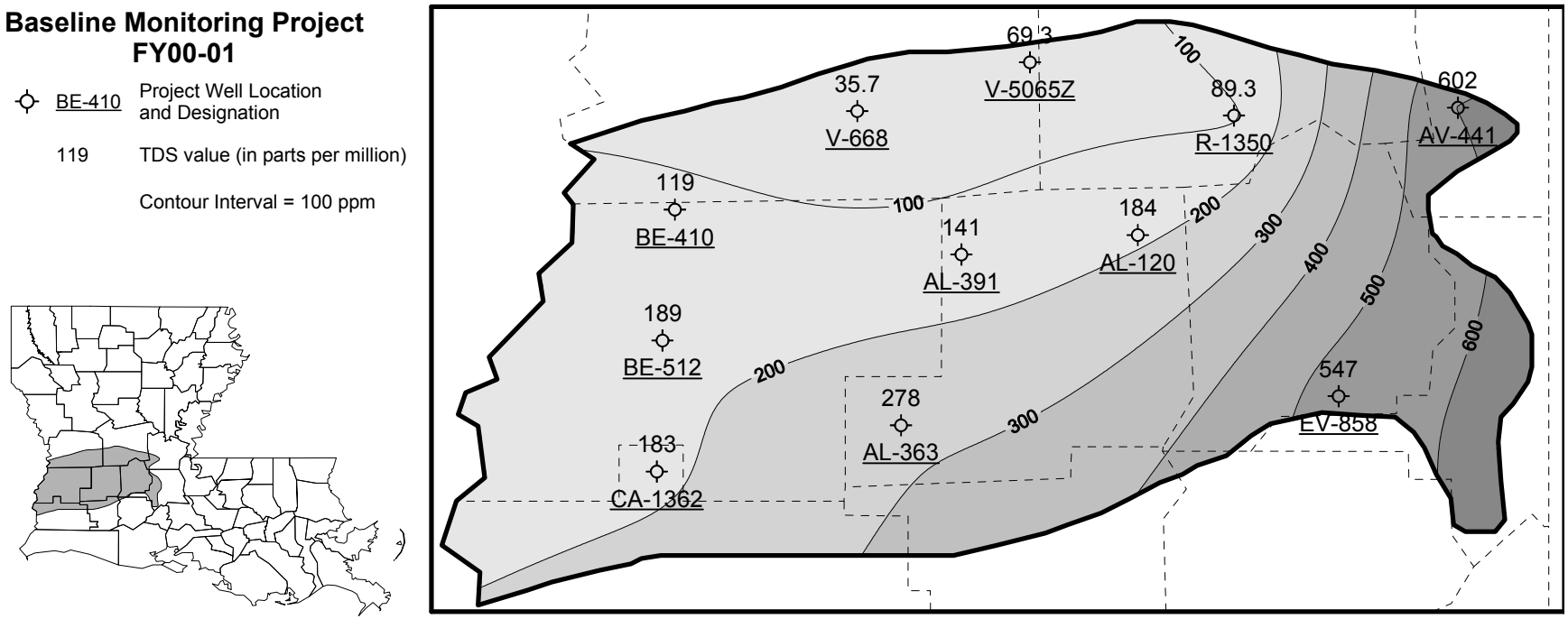


Figure 4.1.3
Map of TDS Data

EVANGELINE AQUIFER - CHLORIDE (PPM)

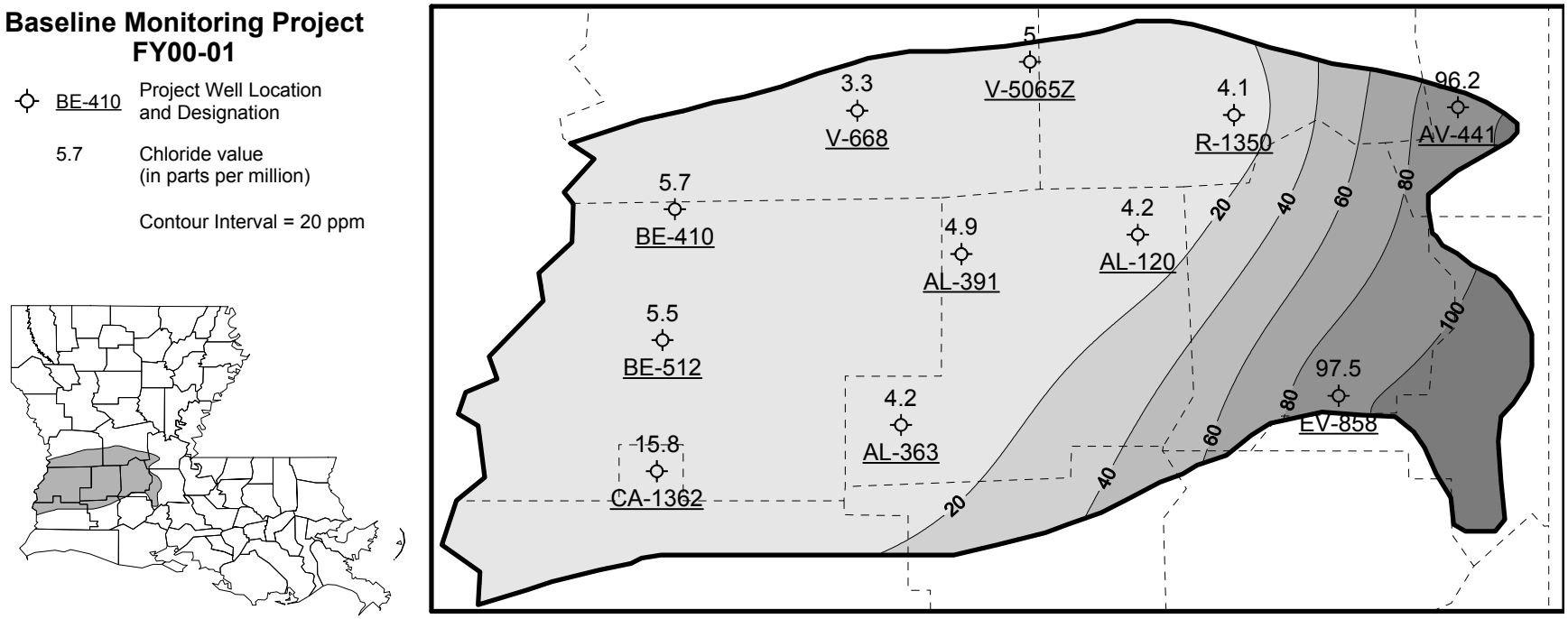


Figure 4.1.4
Map of Chloride Data

EVANGELINE AQUIFER -IRON (PPB)

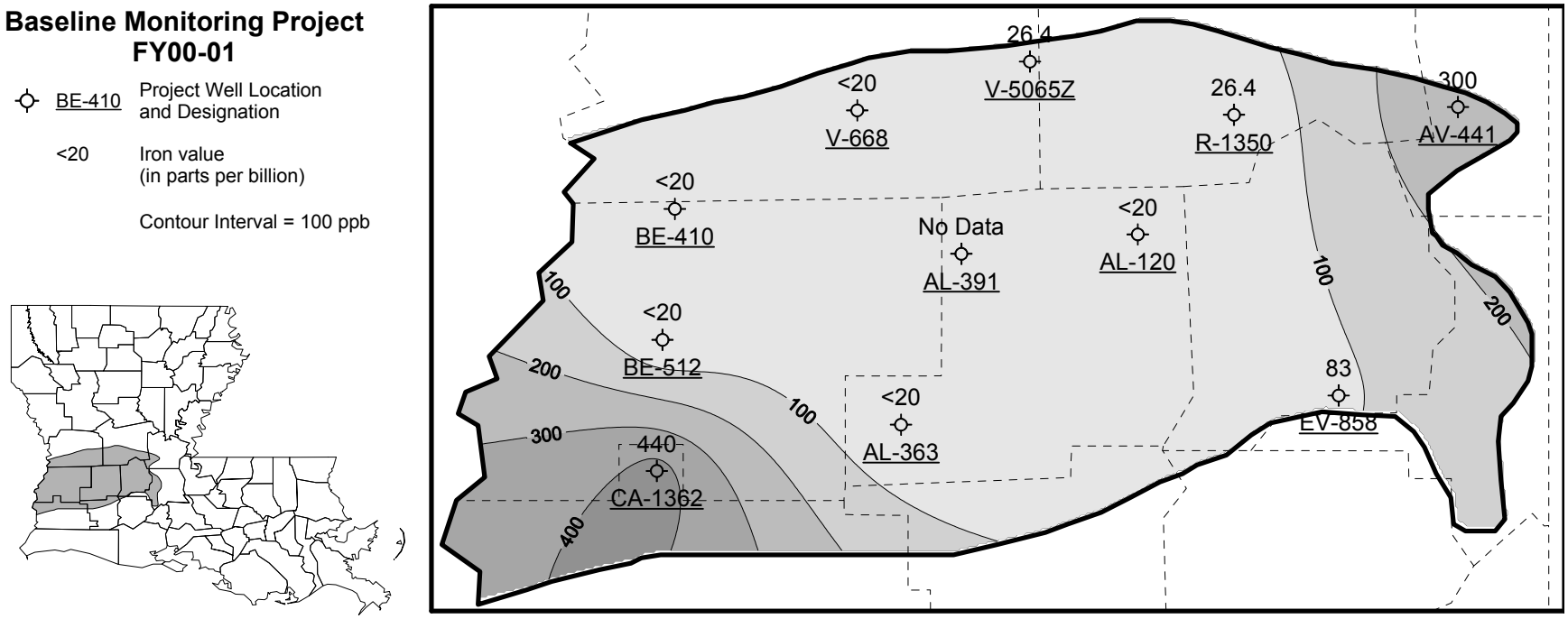


Figure 4.1.5
Map of Iron Data